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Effect of oil prices fluctuations on industrial productions in Iran

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Abstract

Increase in oil price can affect industrial productions and price index of industries in oil exporting country such as Iran in two phases: increase in oil price causes increase in monetary base and this is an experience which has occurred in Iran's economy in recent decades. Increase in liquidity and monetary base increases the price and industrial productions by increasing demand. On the other hand, increase of oil price influences price and production through production cost. Increase in oil revenues through importing raw materials causes decrease in production cost and supply of industries and leads to decrease of price and increase of production. In this study, considering close relationship between oil price and macro variables and industrial productions, we study the effects of oil price shocks among these variables by applying data of 19 different industries in Iran during 1994:1-2008:4 using Vector Auto Regression (VAR) method. In general, one can conclude that oil price shock increases supply for the industries whose share of oil cost is high, such as chemicals, medical tools, rubber & plastic manufacturing, radio and TV manufacturing, motor vehicles manufacturing and machinery manufacturing industries,. On the contrary, oil price shock increases demand for other industries, such as clothing, food, paper production and metals manufacturing industries. The findings of VAR model indicate that according to effect of input cost, supply channel of a channel whose industries are affected by oil price shock is not important. Estimates show that the effect of oil price shock on demand is more important than that of supply in most industries.

Keywords: Oil Price Shocks, Industry supply and demand, Industrial productions, VAR Model

Introduction

Energy particularly oil is considered as an important parameter in global economy relating to growth and development. Experience has shown that this important factor is subject to special changes as an exogenous variable, which are mainly unpredictable and affect the economy and industrial development of countries in the world including oil producer or oil consumer.

In recent decades, oil price fluctuations have coincided with dramatic economic changes. This caused researchers to study the relationship of this trend over the time. The occurrence of big oil shocks and appearance of important economic phenomena such as global recession, inflation, etc. have diverted more attentions to this subject.

Oil plays very important role in economy of Iran. Iran is manufacturer of 10 % of total oil in the world and is the second oil manufacturer in the world after Saudi Arabia. Considering these conditions, Iran largely affects global oil market and is naturally affected. As it is obvious, Iran is very dependent on oil exports. Perhaps above 90 % of total revenue is obtained from oil export by the country and about 70% of annual budget is revenue of oil sale. Also, the share of oil in gross domestic product of the country has been 20% during 1970-2006. In these circumstances, any kind of shock in global oil market can have a significant effect on the government budget and economic structure of Iran.

In petroleum exporting countries, such as Iran, usually the oil revenues obtained from oil export directly or indirectly enter the government budget. Oil revenues are injected into the country's economy in two current and civil forms through government costs. Oil revenues have different effects on economy of the less -developed countries,

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most of which are also petroleum exporters. These oil revenues supply major part of the government revenues and since the government has a dominant role in the economy of these countries, as a result, oil revenues fluctuations affect the macroeconomic variables such as economic growth, consumption, national saving, investment, production, exchange rate and inflation rate.

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On the contrary, with decrease of oil price, since oil revenues have decreased, production decreases in these countries due to limited access to capital and intermediate goods as well as uselessness of a part of the capital capacity of production. When oil revenues are high, higher motivation arises for growth of consumption. But when the oil revenues decrease, production and import of goods and services will decrease inevitably while the demand rate does not decrease proportionally because the consumption expectations have remained high, therefore, inflation appears through budget deficit. When the oil price is high, the investment grows in large and sometimes ambitious projects of the government and when the oil price decreases, these projects are left unfinished and thus increase in costs associated with the completion of the projects usually lead to efficiency loss, waste of resources and financial and administrative corruptions. On the other hand, financial and administrative corruptions result in waste of more resources and propagation of decadent economic culture.

Lee and Nee (2001) relying on SVAR model showed that considerable similarities have been observed in responses of production to oil price shocks in most industries. In response to oil price shock, the production rate decreased after 10 months of delay and this decrease had a short life. There is a slight relationship between the oil price stimulus as the production reducer and oil industries while both demand and supply of industries have been affected by oil price shocks. They also showed that oil price shocks caused reduction of supply in oil industries and reduction of demand in many other industries, especially machine industry. Blanchard and Gally (2007) using VAR model during 1970-2006 tested the hypothesis of difference between effects of oil price increase in 5 recent years and years of 1970s and concluded that these effects were different. They attributed this difference to the adopted monetary policies, decrease in oil share of the global energy, different nature of oil shocks, etc. Kandow, *et al*. (2003) consider an oil non-linear model for their study and state that oil price has permanent and stable effect on the inflation and a short-term and asymmetric effect on GDP growth. He concluded that increase in oil price have an asymmetric effect on industrial productions and this effect is negative while when oil price decreases, this effect is small and insignificant. Rodriguez and Sanchez (2004) studied the effect of oil prices fluctuations on actual activities of industrial countries using linear and non-linear VAR models. Their results regarding oil exporting countries showed that increase in oil price had a positive effect on economic growth in Norway while increase in oil price had a negative effect on economic growth in England. This difference is due to high exchange in England as well as different adjustments in inflation, wage and interest rates. Hwang,and Hwang (2005) studied effects of oil price on USA, Canada, Japan using multivariate threshold model relying on Sadresky's VAR model (1996) during 1970-2002 and mentioned that if the oil prices fluctuations do not exceed a specific limit, they will not have significant effect on economy of these countries. But if these fluctuations exceed this limit, they leave a deep impact on the economy as one can easily explain the changes in economy in this way.

Methodology

Figure (1) relates to variable of oil price growth rate in Iran during 1994-2008. As observed from the diagram, this variable had very high fluctuations during this period and has experienced many increases and decreases. The minimum growth rate of oil price occurs in 1998, which has experienced about -34% of reduction. After the negative price shock in 1998, it can be observed from the diagram that we had a positive shock of about 55%, in the country in 2000. Then after a weak negative shock in 2001, a moderate trend is observed in the oil price from this year to 2003. Then, we have an oil positive shock without significant decreases until the end of the period.

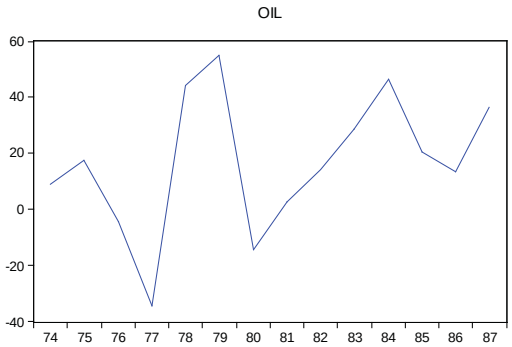

Figure 1. Oil price growth rate

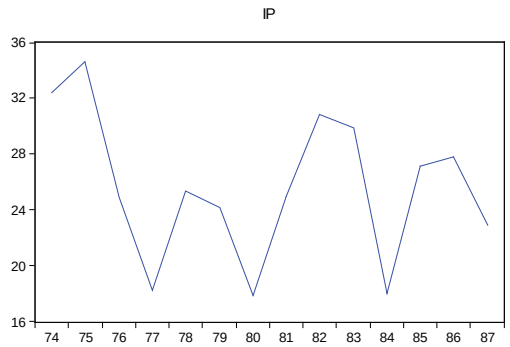

Figure 2. Industrial productions growth rate

Figure 2 demonstrates industrial production growth rate variable during 1994-2008. The maximum growth rate of 34% increases in 1996. In general, one can say that the growth rate of industrial productions was continuously positive during the period. As it is observed in the diagram, during the years which oil price significantly decreases, e.g. 1998 during which we had the largest negative oil shock, industrial productions significantly decreased compared with previous years. This problem can also be seen in 2001 when we had a negative oil shock. During years with positive oil shock, we can see some increases in production. In general, it can be concluded that negative oil price shock had higher effect on productions than its positive shock.

Table (1) lists the average and standard deviation of the model variables from 1994 to 2008. During this period, the average growth of liquidity is higher than that of other variables of the model. Also the standard deviation of oil price growth is 24% which is much higher than other variables in the model. This shows high fluctuations of this variable during the studied period.

The statistical population in this research is Iran and statistics related to estimation of model is expressed seasonally from 1994 to 2008.

In this research, the effect of oil price fluctuations on industrial productions in Iran is studied using vector auto regression model (VAR). Since there is a positive relationship between all variables of the model and time, it is necessary to first test the reliability or, in other words, the presence of a unit root and then co-integration. Then the research models are estimated and the results are analyzed.

Table 1. Changes of variables (average 1994-2008) – percent

Variable	Liquidity growth	Oil price growth	Industrial productions growth	GDP growth	Inflation rate
Average	27.9	16.8	25.6	26.3	18.9
Standard deviation	7.8	24.7	5.2	8.8	9.4

Identifying key indicators of industry level data

In this section, a base is provided for testing the relationship between oil price and industrial productions.

The model used in this study is based on Lee and Nee's study (2002). Therefore, in this study, the set of VAR model can be written as follows:

$$lip_t=a_{10}+a_{11}lip_{t-1}+a_{12}loil_{t-1}+a_{13}lgdp_{t-1}+a_{14}lcpi_{t-1}+a_{15}lm_{t-1}+e_{ipt} \quad (1)$$

$$loil_t=a_{20}+a_{21}lip_{t-1}+a_{22}loil_{t-1}+a_{23}lgdp_{t-1}+a_{24}lcpi_{t-1}+a_{25}lm_{t-1}+e_{oilt} \quad (2)$$

$$lgdp_t=a_{30}+a_{31}lip_{t-1}+a_{32}loil_{t-1}+a_{33}lgdp_{t-1}+a_{34}lcpi_{t-1}+a_{35}lm_{t-1}+e_{gdpt} \quad (3)$$

$$lcpi_t=a_{40}+a_{41}lip_{t-1}+a_{42}loil_{t-1}+a_{43}lgdp_{t-1}+a_{44}lcpi_{t-1}+a_{45}lm_{t-1}+e_{cpit} \quad (4)$$

$$lm_t=a_{50}+a_{51}lip_{t-1}+a_{52}loil_{t-1}+a_{53}lgdp_{t-1}+a_{54}lcpi_{t-1}+a_{55}lm_{t-1}+e_{mt} \quad (5)$$

Where:

lip: logarithm of industrial productions, loil: logarithm of oil price, lm: logarithm of liquidity size, lcpi: logarithm of consumer price index, lgdp: logarithm of gross domestic product (GDP).

The purpose of this study is to estimate equation (1), i.e. studying the effect of oil prices fluctuation and other macro variables on industrial productions.

Based on the mentioned theoretical fundamentals, oil price, liquidity size and GDP are expected to have a positive effect and inflation is expected to have negative effect on industrial productions.

In the next part of the model, we study the simultaneous effects of oil price shocks on demand and supply of 19 different industries.

Simultaneous effects of oil price shock on supply and demand are studied with equations (6) and (7):

$$Lyi_t=c_{10}+\Sigma c_{11}loil_{t-p}+\Sigma c_{12}lyi_{t-p}+\Sigma c_{13}lpi_{t-p}+e_{yi} \quad (6)$$

$$Lpi_t=c_{20}+\Sigma c_{21}loil_{t-p}+\Sigma c_{22}lyi_{t-p}+\Sigma c_{23}lpi_{t-p}+e_{pi} \quad (7)$$

Where:

Lyi: logarithm of individual industries products, lpi: logarithm of price index of the individual industries, loil: logarithm of oil price.

If the production and price move in the same direction after the oil price shock, the dominant effect will be on the demand side while if they move in opposite direction, the dominant effect will be on the supply side. The sign of oil price coefficients c_{11} and c_{21}, indicates the simultaneous effects of oil price shocks on industries demand and supply.

The empirical results

Unit root and cointegration tests

In this study, stationary test has been used for all-time series before VAR model is estimated. If the studied time series is not station, we are not able to use autoregression models due to emergence of false regression. For stationary test, unit root tests have been used. One of the most common tests for identifying the unit root is augmented Dickey-Fuller test, which is used in this research. Results show that all variables become reliable with first-order difference.

The first step is determining the optimal lag length; and the proper lag is equal to 1 according to Shwartz's statistics. In the next step, the possibility of the presence of long-term Cointegration vectors is tested. For this purpose, the Johanson Cointegration method is used. The results obtained from determination of the Cointegration vectors (based on maximum special value and effect tests) are summarized in table (2,3); According to maximum special value test and effect test, the presence of 3 Cointegration vectors is confirmed.

Impulse response of a five-macro variable reduced-form VAR

Response function evaluates the effect of impulses in a scheduled manner. One can specify duration of impulse effect and maximum impulse effect after the impulse occurrence using this criterion. In order to analyze the effect of unpredicted political shocks on macro variables, use of impulse response functions gives better results because equal shocks leave different effects proportionally to their properties in economy and study of the shocks and their corresponding time periods can help the policy-makers know effect on the total economic system.

The obvious characteristic of VAR model is use of estimated residuals for analyzing the dynamics of the model. In this model, on the contrary to traditional attitude of economy, residuals act like actual parts of the system. Impulse response functions are useful tools for analyzing the behavior of the model variables while unpredictable shocks occur in other variables of the model. This capability is due to the fact that these functions show the response of all variables in the system due to a shock in different sizes in one of the variables. Thus, this tool can be used for analysis of the effects of structural shocks on target variables. In other words, the impulse response function shows the response of an endogenous variable to a change in one of the disorder or stimulation terms over the time.

In order to study impulse response, we study the effect of a standard deviation of variable impulse on other variables. The following figures show the response function of industrial productions relative to impulses with one standard deviation of the estimation error in the distance between two standard deviations.

Table 2. Determining the number of Cointegration vectors based on special value test

Null Hypothesis	Alternative hypothesis	Maximum Special value statistics	Critical value for 95% confidence	Critical value for 90% confidence
$r = 0$	$r = 1$	150.1	29.9	27.5
$r \prec = 1$	$r = 2$	75.8	23.9	21.5
$r \prec = 2$	$r = 3$	18.7	17.6	15.5
$r \prec = 3$	$r = 4$	4.9	11.03	9.2
$r \prec = 4$	$r = 5$	2.9	4.16	3.04

Table 3. Specifying the number of Cointegration vectors based on effect test

Null Hypothesis	Alternative hypothesis	effect statistics	Critical value for 95% confidence	Critical value for 90% confidence
$r = 0$	$r = 1$	252.6	59.3	55.4
$r \prec = 1$	$r = 2$	102.5	39.8	36.6
$r \prec = 2$	$r = 3$	26.6	24.05	21.4
$r \prec = 3$	$r = 4$	7.8	12.3	10.2
$r \prec = 4$	$r = 5$	2.9	4.16	3.04

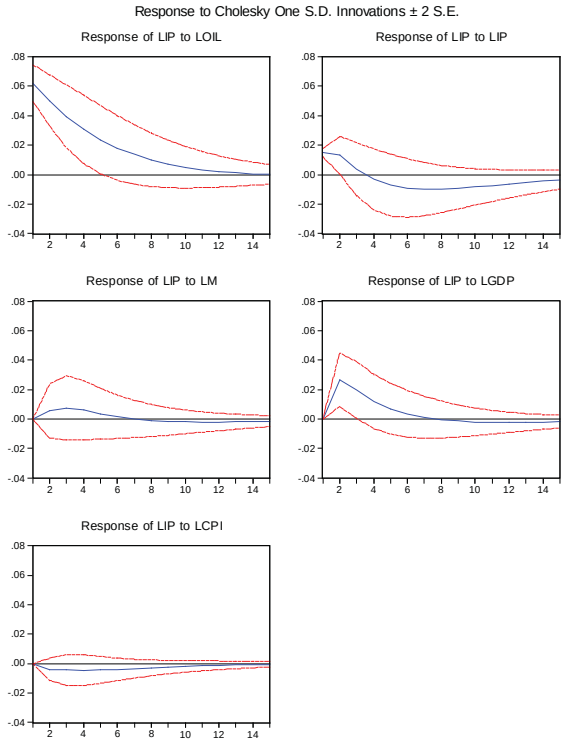

Figure 3. Response of industrial productions to impulses applied through other variables

In Figure 3, the effect of impulses applied to the model and response of productions to these impulses are shown for 15 periods. The effect of impulses applied to the model is adjusted after 15 periods which indicates the model's stability.

Impulses applied by the variable itself (lip) have a decreasing effect on productions and it is adjusted until the last period. Results show that an abrupt change or impulse in oil price variable (loil) with size of 1 standard deviation during the first period (first season) causes increase of industrial productions by 0.06 units. This effect in second season causes increase of industrial productions by 0.05 units. Effect of this impulse in the next seasons has similarly positive and decreasing effect on the productions so that effect of shock gradually disappears after 15 periods and oil impulses lead to increase in productions by 0.0001 units during the 15th period.

Impulses applied by liquidity size variable (lm) do not have any effect on industrial productions during the first period. In other words, liquidity growth with one-period lag influences increase of industrial productions. From the second to fourth season, the growth of this variable causes increase in industrial productions and from 5th period later on, the effect of this liquidity shock decreases and it is adjusted and disappears during the last period.

Also, if GDP (including oil) increases by one standard deviation, it will not have effect on industrial productions during the 1st season. It has the maximum effect in the second season and thereafter, it has a decreasing positive effect on productions. This shock gradually disappears in the last period. The effect of inflation impulses on productions is negative and negligible.

Estimation of VAR that include industry data

In this section, we study the simultaneous effects of oil price shocks on supply and demand of 19 different industries.

Simultaneous effects of oil price shocks on supply and demand of industries are studied according to Lee and Nee's study (2002) using equations (6,7):

$$Lyi_t = c_{10} + \Sigma c_{11} loil_{t-p} + \Sigma c_{12} lyi_{t-p} + \Sigma c_{13} lpi_{t-p}$$

$$Lpi_t = c_{20} + \Sigma c_{21} loil_{t-p} + \Sigma c_{22} lyi_{t-p} + \Sigma c_{23} lpi_{t-p}$$

The 2nd column of the table (6) shows oil price coefficients $\{c_{11}, c_{21}\}$, 3rd column shows industries production coefficients $\{c_{12}, c_{22}\}$ and the 4th column shows prices of the industries $\{c_{13}, c_{23}\}$. c_{13} and c_{22} are opposite of each other.

Coefficients c_{13} and c_{22} are very small which indicates that the demand curve of industries is nearly vertical and supply curve is nearly horizontal and the supply curve is nearly vertical and demand curve is nearly horizontal.

Table 4. Simultaneous effects of oil price shocks on demand and supply of industries Eq.(2,3)

Industries	Oil price coefficient	Production coefficient	Price coefficient	Supply or demand
Manufacture of medical and optical tools and instruments	0.01(1.04) -0.05(-3.2)	0.88(15.2) -0.07(-0.92)	0.03(1.02) 0.82(15.7)	Demand (2) Supply (3)
Manufacture of Radio and TV, communication devices	0.01(0.90) -0.03(-2.08)	0.10(0.71) 0.85(5.44)	0.2(2.27) -0.02(-0.28)	Demand (2) Supply (3)
Manufacture of unclassified equipment and machineries	0.01(2.57) -0.008(0.80)	0.9(24.6) 0.04(0.54)	-0.005(-0.17) 0.76(12.4)	Demand (2) Supply (3)
Manufacture of fabric metal products except machineries and equipment	0.03(3.84) 0.01(0.66)	0.76(12) -0.05(-0.39)	0.07(2.2) 0.79(10)	Demand (2) Supply (3)
Manufacture of basic metals	0.04(4.22) 0.02(1.09)	0.86(18.2) -0.08(-0.84)	0.10(1.92) 0.72(6.44)	Demand (2) Supply (3)
Manufacture of other non-metallic mineral products	0.003(1.23) 0.01(0.86)	0.9(13.9) 0.68(2.62)	-0.02(-0.75) 0.58(5.12)	Demand (2) Supply (3)
Manufacture of furniture and other artifacts	0.007(0.35) 0.05(2.49)	0.85(27.2) 0.01(0.25)	-0.30(-4.39) 0.76(8.42)	Demand (2) Supply (3)
Manufacture of products from rubber and plastic	0.0202(2.71) -0.0201(-1.2)	0.85(13) 0.18(1.33)	-0.34(-0.01) 0.79(10.8)	Demand (2) Supply (3)
Manufacture of chemicals and chemical products	-0.003(-0.34) -0.04(-1.56)	-0.08(-0.51) -0.10(-1.5)	-0.67(-1.54) 0.13(0.73)	Demand (2) Supply (3)
Manufacture of coke, products derived from petroleum refining and nuclear fuels	0.011(0.37) -0.01(-0.23)	1.03(8.37) 0.05(0.23)	-0.05(-0.45) 0.58(3.36)	Demand (2) Supply (3)
Manufacture of paper and paper products	-0.001(-0.12) -0.002(-0.20)	0.9(25) 0.12(2.8)	-0.13(-2.4) 0.89(15.4)	Demand (2) Supply (3)
Manufacture of wood and wood products	0.003(0.35) 0.009(0.54)	1.04(9.3) 0.26(1.01)	-0.05(-0.61) 0.56(3.98)	Demand (2) Supply (3)
Tanning and finishing leather	0.0006(0.05) 0.02(1.74)	1(16.6) 0.11(1.0)	-0.25(-2.08) 1.09(7.75)	Demand (2) Supply (3)
Manufacture of clothing, fur curing and dyeing	0.0001(0.01) -0.01(-0.96)	-0.78(-7.5) 0.15(0.8)	-0.007(-0.12) -0.16(-1.36)	Demand (2) Supply (3)
Manufacture of textile	0.15(3.6) 0.15(1.4)	0.9(21) 0.04(0.3)	-2.5(-0.07) 0.75(10.9)	Demand (2) Supply (3)
Manufacture of products from tobacco	-0.01(-0.81) 0.02(0.83)	0.1(9.5) 0.18(0.91)	-0.14(-1.56) 0.9(7.76)	Demand (2) Supply (3)
Manufacture of food and beverage	0.005(2.33) 0.0002(0.04)	0.1(56.5) 0.15(3.64)	-0.13(-6.63) 0.8(17.6)	Demand (2) Supply (3)
Manufacture of other transportation equipment	-0.001(-0.08) 0.004(0.2)	0.1(21) -0.19(-1.53)	0.01(0.14) 0.8(7.3)	Demand (2) Supply (3)
Manufacture of motor vehicles	0.03(2.5) -0.01(-0.83)	-0.15(-1.13) 0.29(1.5)	0.06(0.68) 0.06(0.46)	Demand (2) Supply (3)

The Numbers inside the parenthesis indicate the t statistic; In the last column, the numbers inside the parenthesis indicate eq. 6 and 7; Recourse : the research calculations by Eview software

The sign of oil price coefficients c_{11} and c_{21} indicates the simultaneous effects of oil price shocks on demand and supply of the industries. For example, table 4 indicates that increase in oil price significantly increases supply of medical tools, manufacture of radio and TV, machineries, metal products, chemicals, clothing, fur dyeing, products derived from petroleum refining, manufacture of other transportation equipment, and motor vehicles industries while it gradually increases the demand of these industries. A positive oil price shock significantly increases manufacture of basic metals, other mineral products, tobacco, paper, wood products and tanning while it gradually increases the supply of these industries. For industries such as furniture, rubber and plastic, textile, the oil shock has similar effect on supply and demand.

Table 5. Response function of price and production of industries to oil price shock

Industries	Shock effect on price	Shock effect on production	Shock effects on oil price
Manufacture of motor vehicles	-	+	Increase in supply
Manufacture of medical and optical tools and instruments	-	+	Increase in supply
Manufacture of radio, TV and communication devices	-	+	Increase in supply
Manufacture of machineries and un-classified equipment	-	+	At first Increase in supply
Manufacture of fabric metal products except machineries and equipment	+	+	Increase in demand
Manufacture of basic metals	+	+	Increase in demand
Manufacture of other non-metallic mineral products	+	+	Increase in demand
Manufacture of furniture and other artifacts	+	+	Increase in demand
Manufacture of products from rubber and plastic	Not significant	Oscillatory	Increase in supply & demand
Manufacture of chemicals and chemical products	-	+	Increase in supply
Manufacture of coke, products derived from petroleum refining and nuclear fuels	Decreasing and +	+	Increase in supply & increase in demand
Manufacture of paper and paper products	+ and low significance	+ and low significance	Increase in demand
Manufacture of wood and wood products	Oscillatory	+	Increase in supply & increase in demand
Tanning and finishing leather	+	+	Increase in demand
Manufacture of clothing, fur curing and dyeing	-	+	Increase in supply
Manufacture of textile	+	+	Increase in demand
Manufacture of products from tobacco	Oscillatory	Oscillatory	Increase in supply & demand
Manufacture of food and beverage	+	0	Increase in supply& demand
Manufacture of other transportation equipment	-	+	Increase in supply

Impulse responses of industry-level output and price

After estimation of equations (2 & 3), one can obtain the impulse response function of the industries variables to oil price shock. The diagram of response function is shown for all industries in the appendix, this figures demonstrates the response function of production and price of the industries after an impulse with size of one standard deviation of oil price shock.

Table 5 shows the model of impulse response function of the industries price and production to an oil price shock. If the production and price move in the same direction after the oil price shock, the dominant effect will be on the demand side while if they move in opposite direction, the dominant effect will be on the supply side. According to the response function model, the important effect of oil shock is presented in the last column. Results show that as it was expected, oil price shock leaves effects on oil-dependent industries such as manufacture of chemicals, medical tools, radio and TV, etc as supply shock. These results are in agreement with the results obtained by Lee and Nee (2002).

The results of response function show that for example, manufacture of medical tools industry is weakly affected by oil price shock while the price of that industry significantly decreases and considering that the oil price shock is considered as a demand shock for this industry, this result is consistent with the belief that short-term demand for this industry is less elastic and for manufacture of mineral products, one can conclude that short-term supply of this industry is non-elastic considering that oil price shock is a shock of demand side.

Generally, one can conclude that that for industries whose share of oil cost is high, such as chemicals industry, medical tools, manufacture of rubber and plastic and radio and TV, motor vehicles, machinery, oil price shock increases the supply. On the contrary, for other industries, such as manufacture of clothing, food and beverage paper and metal, oil price shock increases the demand. The results of this study are in agreement with expectations of the theory.

Conclusions

In this paper, considering close relationship between oil price and macro variables and industrial productions, we study the effects of oil price shocks among these variables by applying data of 19 different industries in Iran during 1994:1-2008:4 using Vector Auto Regression (VAR) method. In order to test validity of these models, we have used unit root and co-integration tests before the estimation.

Generally, the result of estimations, literature and empirical studies generally indicated confirmation of above mentioned hypotheses. There was a remarkably similarity between production responses of most industries to oil price shock. The VAR model results shows that abrupt change or impulse of oil price variable with one standard deviation causes increase in industrial productions. Impulses of liquidity size variable did not have any effect on industrial productions during the first period. And from 2nd to 4th season, the growth of this variable resulted in increase of industrial productions and from 5th period later on, the effect of this liquidity shock decreases and it is adjusted and disappears during the last period.

As a result, the response of production to monetary policy shock is different from oil price shock. The oil price shock is more permanent compared with monetary policy shock.

Also, if GDP increases by a standard deviation, it will have no effect on industrial productions during the 1st season. It had the maximum effect in the 2nd season and thereafter, it had a decreasing and positive effect on the productions. Effect of inflation impulses on productions was negligible and negative.

Increase in oil price significantly increases supply of medical tools, manufacture of radio and TV, machineries, metal products, chemicals, clothing, fur dyeing, products derived from petroleum refining, manufacture of other transportation equipment, and motor vehicles industries while it gradually increases the demand of these industries. A positive oil price shock significantly increases manufacture of basic metals, other mineral products, tobacco, paper, wood products and tanning while it gradually increases the supply of these industries. For industries such as furniture, rubber and plastic, textile, the oil shock has similar effect on supply and demand.

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term demand for this industry is less elastic and for manufacture of mineral products, one can conclude that short-term supply of this industry is non-elastic considering that oil price shock is a shock of demand side.

Since both supply and demand of the industries are affected by oil price shock, we find that oil price shocks in Iran as an oil exporting country often increases the supply of the oil –dependent industries and it affects their demands for other industries.

Generally, one can conclude that for industries whose oil cost share is high, such as chemicals and medical tools industries, Manufacture of rubber & plastic, Radio & TV, motor vehicles, machineries, the oil price shock increases the supply. On the contrary, for other industries such as Manufacture of clothing, food, paper, metal, the oil price shock increases the demand.

The findings of VAR model indicate that according to effect of input cost, supply channel of a channel whose industries are affected by oil price shock is not important. Estimates show that the effect of oil price shock on demand is more important than that of supply in most industries.

Increase in oil price causes increase in monetary base and this is an experience which has occurred in Iran's economy in recent decades. Increase in liquidity and monetary base increases the price and industrial productions by increasing demand. On the other hand, increase of oil price influences price and production through production cost. Increase in oil revenues through importing raw materials causes decrease in production cost and supply of industries and leads to decrease of price and increase of production.

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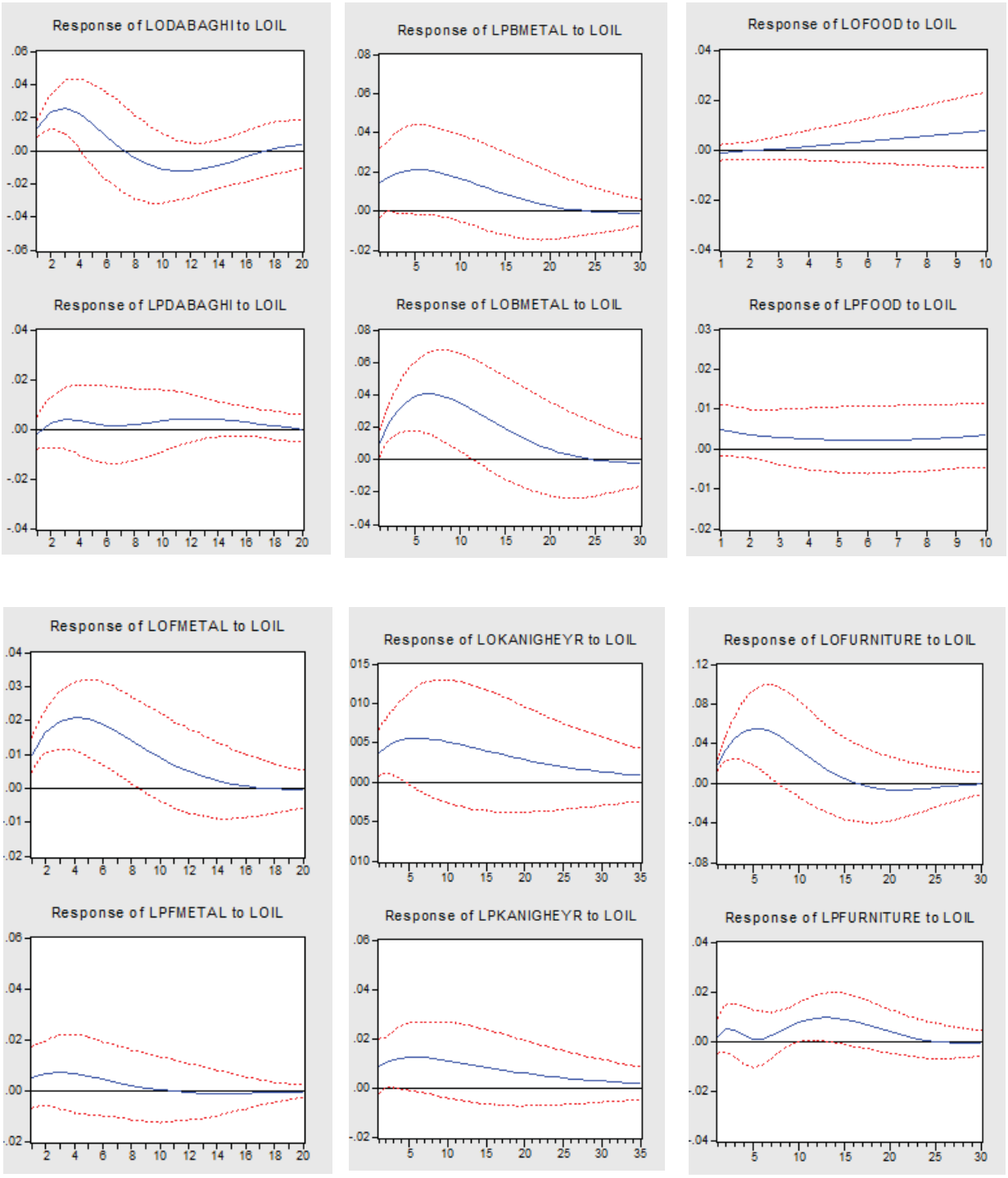
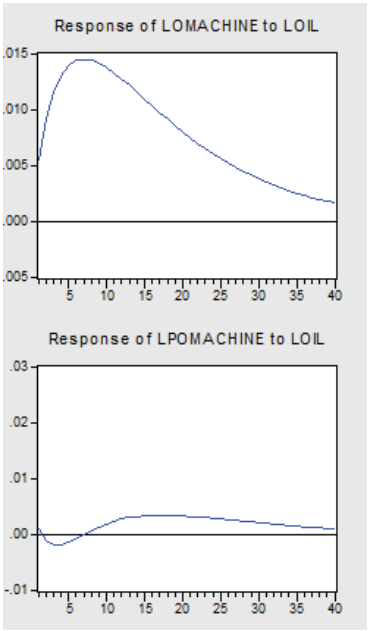
Appendix

Diagram 1. Function of industries response to oil price shock

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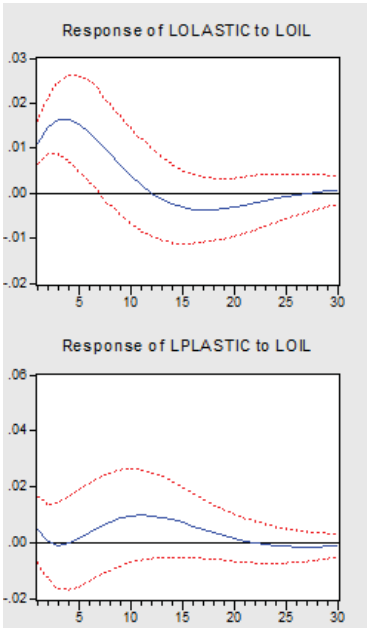
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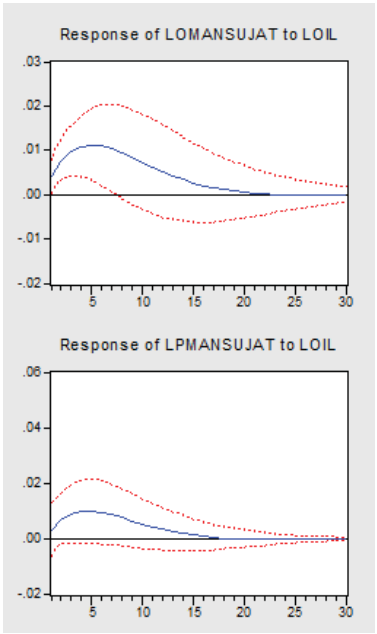
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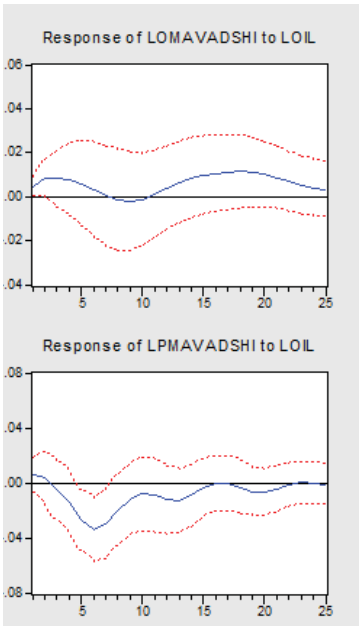
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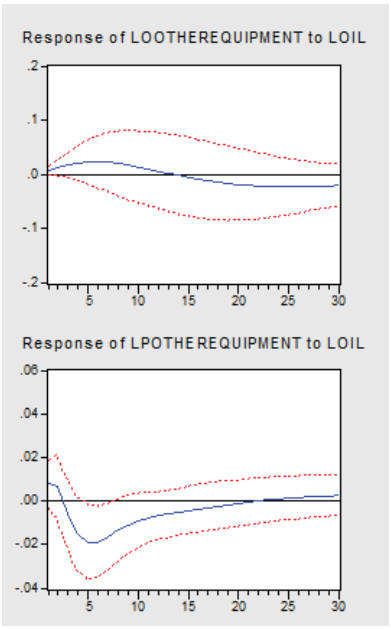
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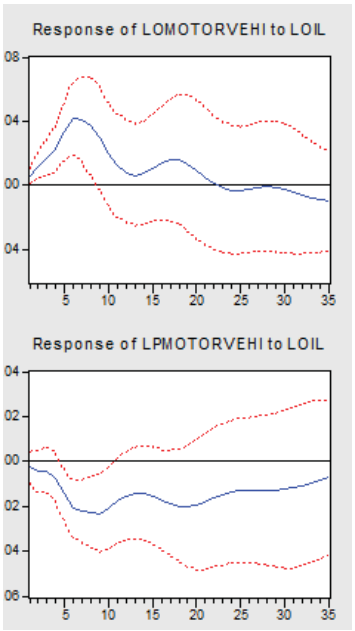
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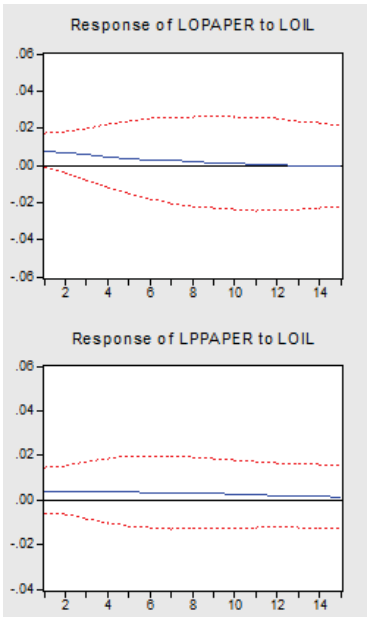
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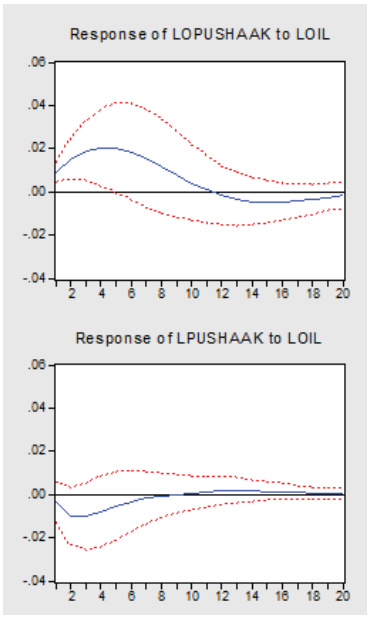
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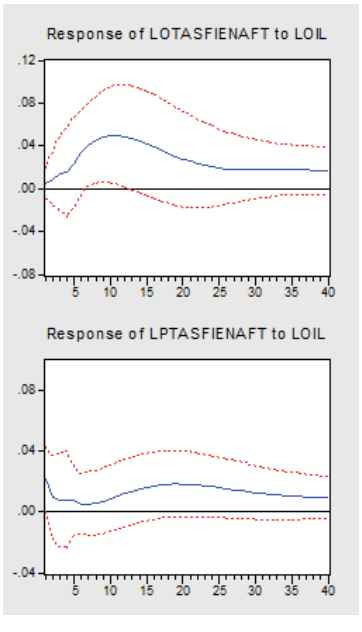
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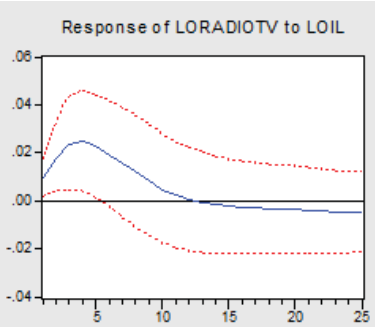
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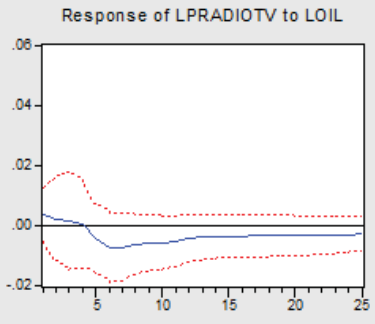
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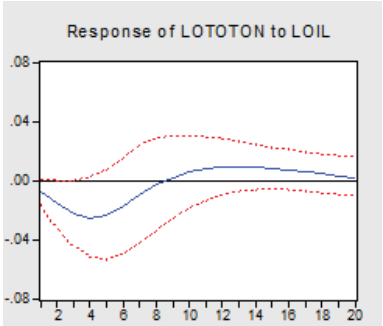
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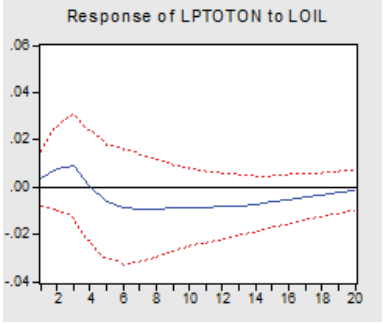
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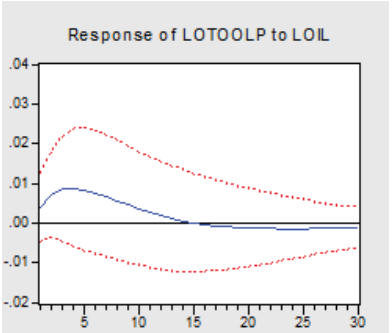
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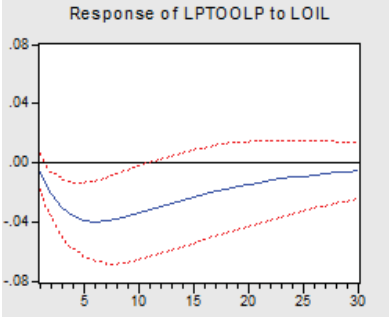
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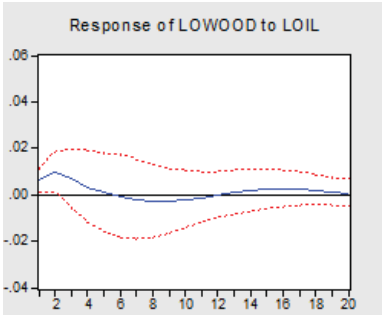
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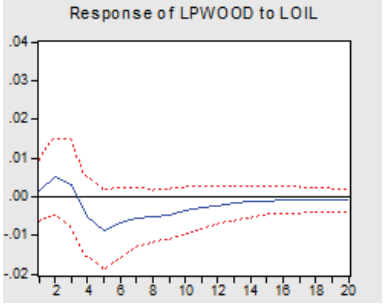
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